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(54) RECORDING MEDIUM CAPABLE OF PREVENTING ILLEGAL COPY

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a recording medium whose copy to a hard disk can be made difficult.

SOLUTION: A non-copying file is recorded, and the presence of the file and the size of the file is checked when an application is activated, and whether or not the actual size of the existing file is matched with the file size is confirmed, and when they are not matched it is determined that any illegal copy is executed, and the application can be prevented from being operated.

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**CLAIMS**

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[Claim(s)]

[Claim 1] The dummy file which is the record medium in which computer reading is possible, and is equipped with bigger dummy file size than the storage capacity of a copied material record medium, The file information record section which stores said dummy file information, and fields other than a file information record section which

store said dummy file information. When the existence of said dummy file is checked and there is a dummy file It checks whether the dummy file size in which it was changed in said file information record section, and the dummy file size stored in fields other than said file information record section are in agreement. When judge that the illegal copy was performed when not in agreement, and it is made not to operate an application program and said dummy file cannot be found An illegal copy prevention record medium equipped with an inspection means to judge that the illegal copy was performed and to make it not operate an application program.

[Claim 2] It is the illegal copy prevention record medium according to claim 1 which said copy former record media are optical disks, such as CD-ROM, CD-R, DVD-ROM, and DVD-R, and is characterized by said copy place record medium being a record medium of molds which can be written in, such as CD-R and a hard disk.

[Claim 3] Said dummy file is an illegal copy prevention record medium according to claim 1 or 2 which come out and is characterized by a certain thing. [ two or more ]

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#### DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the record medium which prevented the illegal copy.

[0002]

[Description of the Prior Art] Conventionally, as an example of a record medium, instead of speech information, the application program of a computer, image data, etc. are written in the disk of the same diameter as CD for audios (compact disk), and the optical disk (CD-ROM) made into the read-only memory is known.

[0003] In such a CD-ROM, the data on CD-ROM can be treated as a file system. A file system is the system of the file group characterized by being a tree structure.

[0004]

[Problem(s) to be Solved by the Invention] However, in the file system of such a CD-ROM, there was a problem that it will be copied simply, with increase of the capacity of a hard disk.

[0005] Moreover, the CD-R drive and the CD-RW drive had also spread, and there was a problem that the user who purchased CD-ROM of a copied material will copy the illegal copy of purchased CD-ROM to CD-R, MO, etc. simply, and will be distributed.

[0006] Then, it sets offering a difficult record medium as the purpose that this invention carries out the similar copy of all the files on the optical disk which has a file structure to record media, such as a hard disk and a mold optical disk which can be written in.

[0007]

[Means for Solving the Problem] In order to attain the above-mentioned purpose invention of claim 1 The dummy file which is the record medium in which computer reading is possible, and is equipped with bigger dummy file size than the storage capacity of a copied material record medium, The file information record section which stores said dummy file information, and fields other than a file information record section which store said dummy file information, When the existence of said dummy file is checked and there is a dummy file It checks whether the dummy file size in which it was changed in said file information record section, and the dummy file size stored in fields other than said file information record section are in agreement. When judge that the illegal copy was performed when not in agreement, and it is made not to operate an application program and said dummy file cannot be found It is an illegal copy prevention record medium equipped with an inspection means to judge that the illegal copy was performed and to make it not operate an application program.

[0008] Moreover, in an illegal copy prevention record medium according to claim 1, the said copy former record media of invention of claim 2 are optical disks, such as CD-ROM, CD-R, DVD-ROM, and DVD-R, and it is characterized by said copy place record medium being a record medium of molds which can be written in, such as CD-R

and a hard disk.

[0009] Moreover, in the illegal copy prevention record medium according to claim 1 or 2, two or more said dummy files come out, and invention of claim 3 is characterized by a certain thing.

[0010]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. After a CD-ROM drive is usually equipped with CD-ROM, the file information (a file structure, a file name, record location, etc.) which exists in the CD-ROM is read from tables of contents (a primary volume descriptor, a pass table, directory record, etc.), and reading and the copy of activation of an application program or data are performed.

[0011] CD-ROM as an illegal copy prevention record medium concerning 1 operation gestalt of this invention For example, the dummy file (file which is not accessed in activation or the usual reading actuation of the usual application program) changed into the larger file size than the storage capacity of CD-ROM of a copied material is made. It is characterized by having added the test routine inspected from the information which described the information on said dummy file to fields other than a table of contents and a table of contents, and described the existence of said dummy file, and the file size which said dummy file changed to fields other than a table of contents and a table of contents.

[0012] Drawing 1 is drawing showing the manufacture approach of the illegal copy prevention record medium concerning 1 operation gestalt of this invention. As shown in drawing 1 (A), first, ISO9660 image (2048 bytes) of CD-ROM as a master is generated, and an image file is created. This chooses creation" for "ISO9660 image, when creating by commercial writer software generally. Drawing 3 is drawing showing the structure of a CD-ROM image file.

[0013] Next, an image file is operated as shown in drawing 1 (B). In actuation of this image file, the file size information on the file which searched and specified the inside of an image file is first rewritten based on a file name. This file turns into a dummy file explained in this example. Next, as shown in drawing 1 (C), ISO9660 changed image is written in a writer and let it be ISO9660 new image file.

[0014] Drawing 2 is drawing showing how to change the file size for manufacturing the illegal copy prevention record medium concerning this invention in false. As shown in drawing 2 (A), the primary volume descriptor in ISO9660 image (it is hereafter described as PVD) is read first. That is, since PVD is mentioned in the location of 16 frames for 00 minutes and 02 seconds in ISO9660 image, after being set to a CD-ROM

drive, a computer reads PVD first. In addition, unless the notation of 16 etc. frames etc. refuses for 00 minutes and 02 seconds, MIN of the header time amount on CD-ROM (sector address), SEC, and FRAC are shown (JIS X6281).

[0015] Drawing 4 is drawing showing the data which dumped the location of 10 (HEX) frame eye (16 frames (00 minutes and 02 seconds)) from this beginning of PVD. In addition, it is shown that (HEX) is the notation of hex decimal (hexadecimal).

[0016] Next, as shown in drawing 2 (B), the field where the pass table in PVD is recorded is read. In drawing 4, L pass table 1 is shown in 8c (HEX)-8f (HEX) address. 16 million→ It turns out that 16 (HEX) sector is the address of a pass table. In addition, in 16 (HEX), when it writes by decimal system, it is 22 (DEC). In addition, it is shown that (DEC) is the notation of decimal system (decimal). Since the start address of the user data area of CD-ROM is 00 frames (00 minutes and 02 seconds), it turns out that L pass table 1 is recorded on 00 frames for 00 minutes and 02 seconds.

[0017] Drawing 5 is drawing showing the discharge data of the pass table of 16 (HEX), and drawing 6 is drawing which described this discharge data for every table. In drawing 6, the sign 2 shows the sector address in which the directory record which is the file information record section of ¥A (root directory) exists. Although 1f of notation tops is 000000, by reading it as 0000001f, it becomes 31 sector and said sector address exists in 31 frames for 00 minutes and 02 seconds. Refer to the Dir number 2 for the table of ¥A. It turns out that the directory record of ¥A exists in 1f (HEX).

[0018] Next, as shown in drawing 2 (C), the inclusion address of a directory record is read. That is, if a pass table is referred to, the inclusion address of the directory record in which the directory specified with the absolute path is shown is known. Next, as shown in drawing 2 (D), the Phil name shown in the absolute path with reference to the directory record is searched.

[0019] Drawing 7 is discharge data of 1f (HEX) sector directory record. In addition, with a decimal system notation, 1f (HEX) is 31 sectors and is 31 frames (00 minutes and 02 seconds).

[0020] In drawing 7, a sign 3 is the directory record table of A.DAT. As shown in the directory record table 3, "00040000 00000400" of the file size of ¥A¥A.DAT means 1024 bytes.

[0021] Next, as shown in drawing 2 (E), the file size of the searched file is changed. That is, it transposes to the size which specified the file size of the directory record table showing the specified file. That is, the file size of ¥A¥A.DAT of the directory record table 3 shown in drawing 7 is rewritten to ffffffffffffffff.

[0022] Below the copied material record medium is a CD-ROM disk or a CD-R disk, and the example of file size modification in the medium by which the logical format of the recorded logical format was carried out by ISO9660 is described.

[0023] Although this CD-ROM disk includes the file of the identifier of ¥A¥A.DAT and the file size of that file shows current [ 1024 bytes of ], CD-ROM created newly comes to show 4.2 G bytes (0xffffffff). However, the field of 4.2G cannot be arranged on a CD-ROM disk. To the last, 4.2G are a file size on a directory record, and are not arranged in fact.

[0024] First, program end time is read in the CD-ROM disk as a master, or CD-R (it is called a disk below) with a CD-ROM drive.

[0025] Next, with a CD-ROM drive, it reads in a disk in a sector unit from 00 head time amount of a disk to end time for 00 minutes and 02 seconds, and outputs to the file of mass media, such as a hard disk. This file name is set to CDROM.IMG.

[0026] The location where the directory record about ¥A¥A.DAT was recorded is searched from the interior of data of CDROM.DAT. The data of PVD of 16 sector eye are first stored in memory. Since the address of L pass table is described by 8c (HEX)-8f (HEX) of memory, it is read. In this example, it turns out that L pass table exists in 16Hex sector. (Refer to drawing 4 )

[0027] Since a pass table is 16Hex=32 (DEC), 32 sector eye is stored in memory. From the data stored in memory, the pass table record described about ¥A is searched. It turns out that the directory existence address of directory ¥A is 1f (HEX). (Refer to drawing 5 and drawing 6 )

[0028] Since the directory record of ¥A is 1f (Hex) 31 sector, it stores the data of 31 sector in memory. A. Search the directory record of DAT.

[0029] The directory record of A.DAT was found in the discharge data shown in drawing 7 . This directory record shows that it is 00000400Hex=1024 byte about a file size. This field is changed into 0xffffffff. Thereby, a file size is changed into 4.2 G bytes from 1024 bytes. In addition, among drawing 7 , a sign 4 shows the inclusion address and a sign 5 shows a file size.

[0030] CD-ROM.DAT is the disk image file by which the file size was corrected about ¥A¥.DAT. CD-R is created with a CD-R writer etc. using CDROM.DAT. It is updated by the new file size, if created CD-R is checked with a personal computer etc. and the file size of ¥A¥A.DAT is checked with the dir command or an EKISUPU roller.

[0031] Furthermore, the illegal copy prevention record medium concerning 1 operation gestalt of this invention, for example, CD-ROM, creates the program which investigates existence of the file which cannot be copied, and a file size and which

operates automatically on CD-ROM, and it makes the disk copied unjustly impossible of operation. This program is a test routine mentioned later, and when a disk is played, it is performed first.

[0032] The sample disk (prototype disk) concerning one example of this invention was produced. Next, the description of this sample disk is explained.

[0033]

[Table 1]

[0034] The test routine shown in Table 1 is recorded on the root directory of the file system of CD-ROM. In addition, a root directory is a directory located in the head of a file system.

[0035] NOCOPY.001–NOCOPY.005 are 0xffffffff (4.2 G bytes), respectively. It is known that only about 650 M bytes of max can be mentioned in CD-ROM.

[0036] The inclusion time amount of the sample disk produced here is about 1 minute. That is, although data are not recorded on a sample disk in fact, the file size of a directory record is set as the greatest value.

[0037] sample.exe opens NOCOPY.001–NOCOPY.005 and investigates whether the file exists in a current directory. Furthermore, it checks whether a file size is 0xffffffff. Therefore, unless it comes out from this disk, SAMPLE.EXE does not operate.

[0038] Here, it copies to a hard disk and the case where it reproduces is considered. First, the structure of read-out of CD-ROM is explained. If CD-ROM is set to a drive, OS or CD-ROM driver software will recognize a CD-ROM set, and will read programs, such as PVD, a pass table, a directory record, and a starting identifier that shows an autostart program, the identifier of data, and magnitude and storing field information.

[0039] Next, a computer memorizes the information on arrangement of the file of CD-ROM, a file name file size, a file starting position, etc. by reading data. Next, a

required file is read with an instruction of a user and the instruction of an autostart program etc.

[0040] In the usual read-out, since the application software which CD-ROM and a computer use does not access a data file with an unusual file size, even if the file size records the unusual data file, it operates normally.

[0041] However, if it is going to carry out the similar copy of read-out for a copy, i.e., all the files on CD-ROM, it will go to read all (data file with an unusual file size) also of a required data file and an unnecessary data file. Since the file size is larger than a copied material, a CD-ROM drive judges it as an error, and stops.

[0042] If it is going to copy such a disk, it is necessary to delete a dummy file or to change the actual size of a dummy file for the dummy file size of a directory record identically. However, since the test routine mentioned later is also copied to the disk copied illegally even if it does in this way and is copied illegally, reproducing is impossible.

[0043] Drawing 8 is drawing showing the flow chart of the file size test routine with which the illegal copy prevention record medium of this invention is equipped. If it is going to play the disk copied illegally, the test routine first shown in drawing 8 will be performed. As shown in drawing 8, a file size test routine opens a dummy file X at step S1 first.

[0044] Next, at step S2, it judges whether there is any dummy file, when there is no dummy file, it progresses to step S4 (in order to copy illegally, when a dummy file is deleted), NG processing is carried out, and when there is a dummy file, it progresses to step S3. In addition, NG processing is an alarm display.

[0045] Next, at step S3, the file size of the dummy file found at step S2 is investigated, the file size judges whether it is 4.2 G bytes, in not being 4.2 G bytes, it progresses to step S4 (in order to copy illegally, when dummy file size is changed), in the case of 4.2 G bytes (the case (in i.e., the case of an original disk) of a copied material record medium), a post process is carried out, and application starts. It is the number \*\*\*\*\* of files about the above file size test routine. Such a test routine is added to the application of CD-ROM.

[0046] Since according to the CD-ROM which added this test routine it is larger than copied material CD-ROM disk capacity when the dummy file size of NOCOPY.001-NOCOPY.005 is created by 4.2G, and copying to a hard disk, if it remains as it is, the copy is impossible and an application program operates normally from CD-ROM of a copied material.

[0047] As mentioned above, the file which cannot be copied is made to record and a

routine which searches a file size to application is incorporated. On CD-ROM, it has recorded by the file which cannot do a copy, for example, a sample disk, to NOCOPY 001-005. Although there are only each 1-K byte contents of NOCOPY 001-005, it has pretended to be a big file like 4.2 G bytes.

[0048] Application SAMPLE.EXE will investigate whether there are actually 4.2 G bytes of these files, if it types with SAMPLE from on CD-R. For investigating whether there are 4.2 G bytes, it says with reference to a pass table, and only finds whether it actually shows 4.2G. Therefore, if this is performed from on a disk, since it will become clear that the file actually exists [ the file size ] by 4.2 G bytes normally, it is thought that the disk is a genuine article.

[0049] However, a user thinks that he will imprint the contents of the file of this disk on other disks, for example, a hard disk. Then, since a field is lost on the way, as for a copy, these files become impossible, and it becomes an error. Since inclusion is carried out as activation is impossible, since these files do not exist if only a SAMPLE .EXE file tends to be copied and it is going to perform on a hard disk, an indication is given as activation is impossible for this EXE file. It becomes 21 G bytes only by building 4.2 G bytes [ 5 ]. These files can be seemingly recorded without limit as 4.2 G bytes of a file (dummy) on a disk.

[0050] Even when what tries an illegal copy should develop the tool which swells a file size to 4.2 G bytes and should try a copy, since the greatest physical magnitude of a current hard disk is about 8 G bytes, it cannot copy two. Even if the capacity of a hard disk becomes large, on CD-ROM, it will need 2 sectors (2048x2 bytes) in the future creating the first one dummy file, but after it, if the stereo of file data is made a share, although 1 file addition is carried out, it will end around 48 bytes (size of a directory record). This is explained in full detail next.

[0051] Drawing 9 is drawing showing the layout structure in the sector mode (01) with which 1 block of CD-ROM is equipped. On CD-ROM, although the first one dummy file is created, as it is shown at drawing 9, the user data field in sector mode (01) is 2048 bytes, and is needed 2 sector (2048x2). If the stereo of file data is shared with the first one dummy file in order to create the dummy file after the 2nd, although 1 file addition is carried out, it will end around 48 bytes (size of a directory record).

[0052] That is, in order to add 128 dummy files, it becomes  $48 \text{ byte} \times 128 = 6144 \text{ byte}$ , and since the user data of 1 sector is 2048 bytes, it consumes only 3 sector.

[0053] That is, the first dummy file [ 1st ] is 2 sector need, and it is required after [ 48 bytes per dummy file of ] the 2nd. Therefore, for adding 128 dummy files, it is 3 sector need.

[0054] In order to create a total of 129 dummy files from the above thing, it is the  $2+3=5$  sector need. Thus, no less than 129 pieces can perform apparent inclusion for 4.2 G bytes of dummy file with only 5 sectors.

[0055] If  $n$  dummy files are required, it can ask by required sector number  $=2+(n-1) \times 48/2048$  (decimal point is revalued). In the case of 74 minutes,  $74 \times 60 \times 75 = 333000$  sector (block) inclusion of the CD-ROM can be carried out. Thus, it turns out that the field needed for anti-copying is [ how ] small.

[0056] when the test routine which checks the file size tended to play the disk, the file would not be copied by automatic activation being made to be carried out first -- it can judge whether it is what is not copied. It investigates whether there is any file and the file size is investigating whether it is the right. That is, it is investigating whether there are actually 4.2G. Thus, before a main program (application) is performed, it has surely been made for the file size test routine to perform.

[0057] Thus, create a dummy file first and are larger than a copied material record medium in the file size of this dummy file. For example, when a copied material record medium is CD-ROM, it changes into 4.2 G bytes. this changed dummy file size -- a file information record section (data --) fields other than the field which describes information other than application, and a file information record section (data --) When it describes to each with the field which describes application, a test routine is prepared in fields other than a file information record section as an autostart program and CD-ROM is reproduced, he is trying for a test routine to start first. Therefore, if a disk is set to a player, first, an autostart program (test routine) will consider as a star, and the test routine mentioned above will be performed.

[0058] In addition, this invention is not limited to the above-mentioned example. For example, it is applicable also to record media other than CD-ROM. Moreover, although the dummy file was made into 4.2 G bytes, as long as it is larger than the capacity of a copied material, it may be larger than 4.2 G bytes, or may be small.

[0059] In the above-mentioned example, although ISO9660 showed the example, it is applicable to CD-ROM file formats, such as UDF other than ISO9660 (universal disk formatting), and a MAC format, etc. However, as for the size which applies only a dummy file in a DVD format, it is desirable that it is over 18 G bytes.

[0060]

[Effect of the Invention] As mentioned above, as explained, according to this invention, the copy to a hard disk has the effectiveness that a difficult record medium can be offered.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the manufacture approach of the illegal copy prevention record medium concerning 1 operation gestalt of this invention.

[Drawing 2] It is drawing showing how to change the file size for manufacturing the illegal copy prevention record medium concerning this invention in false.

[Drawing 3] It is drawing showing the structure of a CD-ROM image.

[Drawing 4] It is drawing showing the 10 (HEX) 00 minute 02 second 16 frame discharge data of PVD.

[Drawing 5] It is drawing showing the discharge data of the pass table of 16 (HEX).

[Drawing 6] It is drawing which described the discharge data of drawing 5 for every table.

[Drawing 7] It is discharge data of 1f (HEX) sector directory record.

[Drawing 8] It is drawing showing the flow chart of the file size test routine with which the illegal copy prevention record medium of this invention is equipped.

[Drawing 9] It is drawing showing the layout structure in the sector mode (01) with which 1 block of CD-ROM is equipped.

[Description of Notations]

1 L Pass Table

2 Sector Address

3 Directory Record Table

S1 The 1st step of a test routine

S2 The 2nd step of a test routine

S3 The 3rd step of a test routine

S4 The 4th step of a test routine